

HE4491
S4 I58
1931

PART TWO

The Commonwealth

Official Journal of the Commonwealth Club of California

Vol. VII

San Francisco, November 17, 1931

No. 46

Inter-County Rapid Transit

Objects of the Club

"To investigate and discuss problems affecting the welfare of the Commonwealth and to aid in their solution."

"To maintain itself in an impartial position as an open forum for the discussion of disputed questions."

Volume XXVI, No. 7
Transactions of the
Commonwealth Club
of California

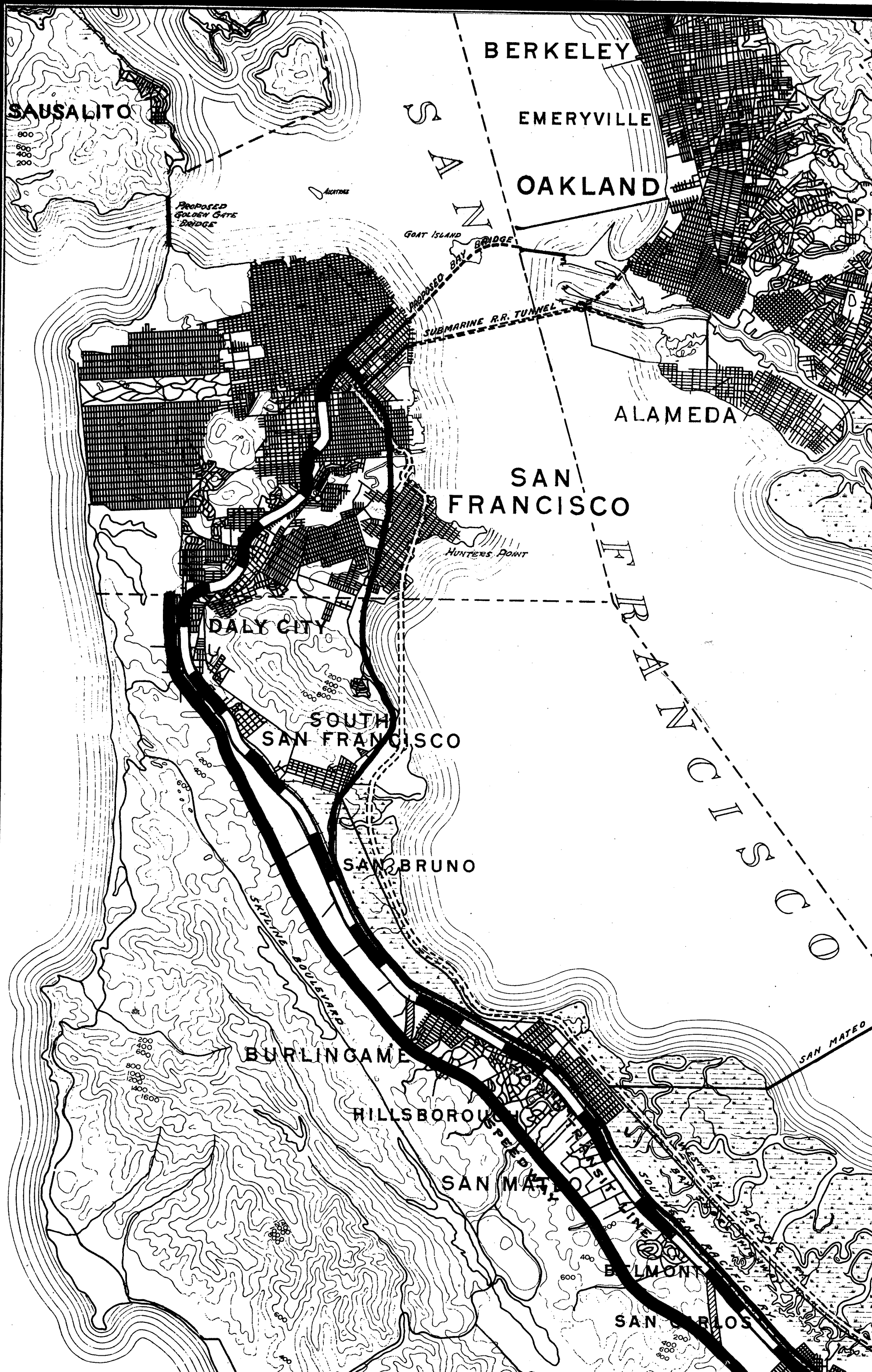


Published Since
May in 1925 as
The Commonwealth
Part Two

LIBRARY

MAR 14 1958

UNIVERSITY OF CALIFORNIA
INSTITUTE OF TRANSPORTATION
AND TRAFFIC ENGINEERING



SAUSALITO

BERKELEY

EMERYVILLE

OAKLAND

ALAMEDA

SAN FRANCISCO

DALY CITY

SOUTH SAN FRANCISCO

SAN BRUNO

BURLINGAME

HILLSBOROUGH

SAN MATEO

BELMONT

SAN CARLOS

SAN FRANCISCO

PROPOSED GOLDEN GATE BRIDGE

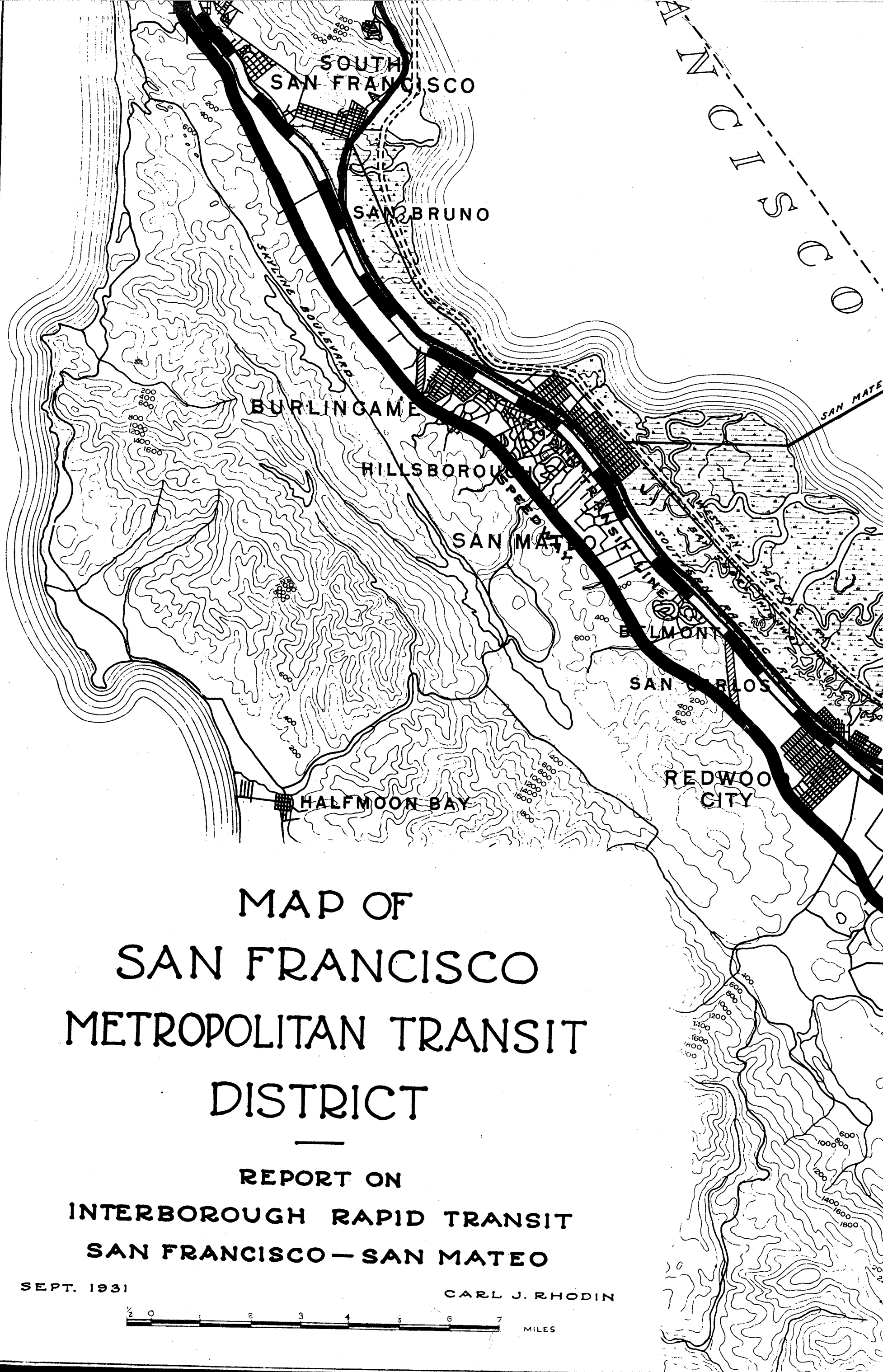
GOAT ISLAND

SUBMARINE R.R. TUNNEL

HUNTERS POINT

SKYLINE BOULEVARD

SAN MATEO



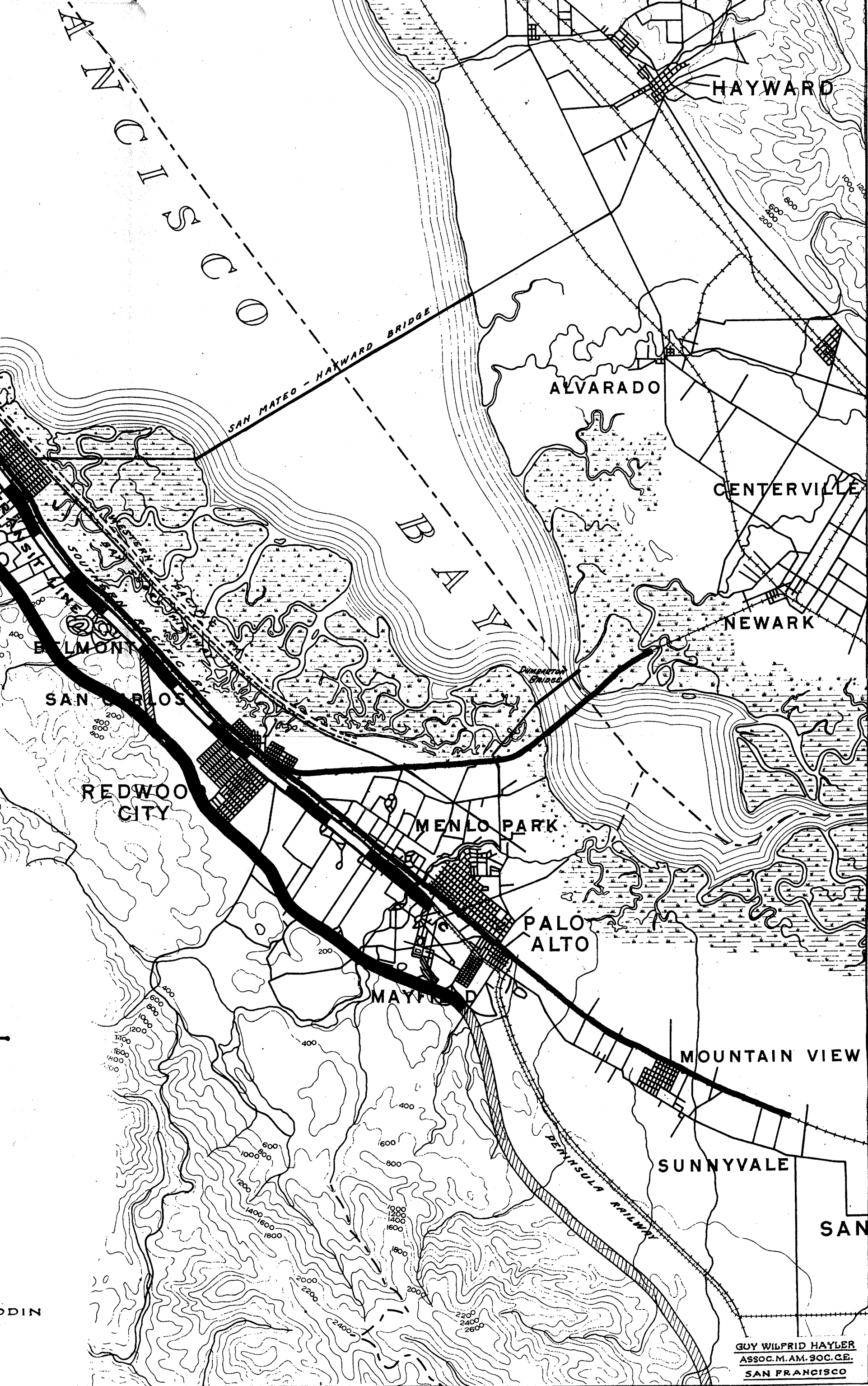
MAP OF SAN FRANCISCO METROPOLITAN TRANSIT DISTRICT

REPORT ON
INTERBOROUGH RAPID TRANSIT
SAN FRANCISCO—SAN MATEO

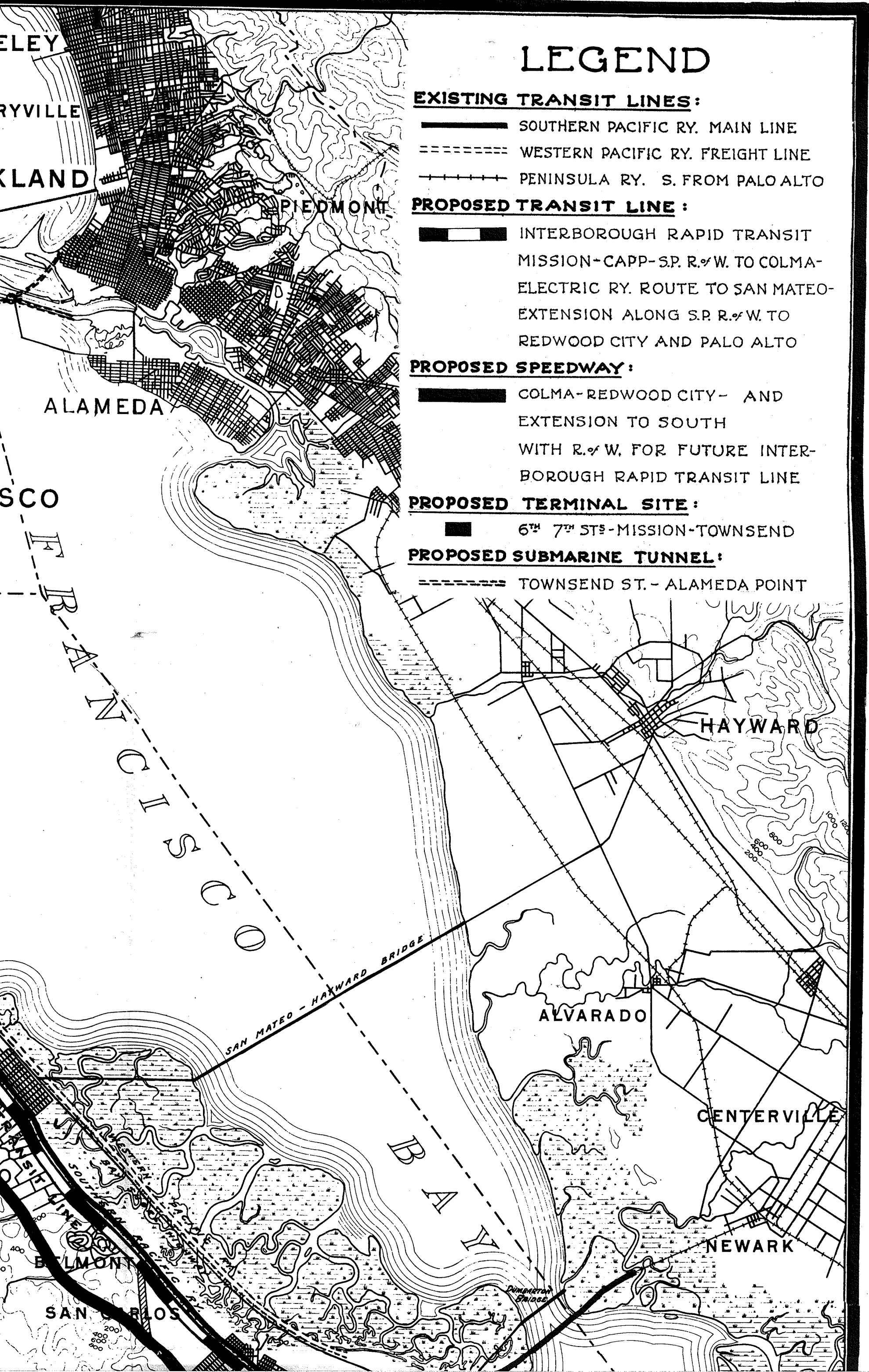
SEPT. 1931

CARL J. RHODIN





GUY WILFRID HAYLER
ASSOC. M. AM. SOC. C.E.
SAN FRANCISCO



15255955

HE449/
S4
I58
1931

The Commonwealth—Part Two

VOL. VII

SAN FRANCISCO, NOVEMBER 17, 1931

No. 46

TRANSACTIONS OF THE Commonwealth Club of California

Volume XXVI

Number 7

INTER-COUNTY RAPID TRANSIT

THE story of civilization may be said to be a corollary to the story of transportation. Even as on the one hand oceans and mountains have tended to prevent the formation of extensive social groups, so rivers, canals, highways, electric and steam railways, and, in recent years, airways, have tended on the other hand to knit peoples more closely together and to produce human units of ever-increasing area and efficiency.

In this present issue of the Transactions, consideration is given to but three of these modes of transporting people and property: highways, steam railways, electric railways. The particular area considered is limited to that section of California which comprises San Francisco, San Mateo, and Santa Clara counties.

Previous issues of the Transactions of the Commonwealth Club of California have included consideration of the Golden Gate Bridge, and the San Francisco Bay Bridge. This present issue, therefore, completes consideration of transportation problems in this part of the State. It is a condensation of material presented before the Club's Dinner meeting of October 16th, 1931.* Arguments for and against the proposals of the Section on City Planning are included in the following pages.

Those interested in other publications of the Commonwealth Club

*At this meeting the walls of the dining room were lined with a number of elaborate and detailed charts giving what is said to have been the first comprehensive exhibit of the rapid transit plans of every city of importance in the United States. This exhibit was prepared by Guy Wilfrid Hayler, Assoc. M. Am. Soc. C. E., under the sponsorship of the Club's Section on City Planning. Several maps from this exhibit are printed in this issue of the Transactions.

I.T.S. LIBRARY U.C. BERKELEY

of California which deal with transportation problems will find them included in the following list of Club Transactions:

Government Regulation of Railroad Freight Rates, 1905.
 Good Roads, 1906.
 The Railroad Commission of California, 1908.
 The Question of Ship Subsidies, 1909.
 Some Conditions of Pacific Ocean Commerce, 1909.
 Rehabilitation of the Merchant Marine, 1910.
 India Basin and State Highways, 1910.
 The Railroad Commission Amendments, 1911.
 Internal Waterways, 1913.
 The State Highways Act, 1916.
 Traffic Hazards, 1922.
 Trans-Bay Transportation, 1922.
 Traffic Hazards, 1923.
 Regional Planning, 1923.
 California's Highways, 1924.
 Highway Finance, 1925.
 Bay Bridges, 1925.
 Aviation in California, 1929.
 Street Railway Ownership, 1930.
 Air Police, 1930.
 Golden Gate Bridge, 1930.

Introduction by President Johnston

TONIGHT'S meeting has been called for the purpose of hearing the report of our Section on City Planning. The Section, under the chairmanship of Mr. Carl J. Rhodin, has been studying the question of "Inter-County Rapid Transit". By our approval of plans for bridges across the bay to the east and to the Marin shore, we have made progress toward the settlement of our transit problems in those directions. Solution of the Peninsula transit problem is important and the presentation of the Section's study is very timely.

The report of the Section will be presented by Mr. Carl J. Rhodin, the chairman.

Report of the Section on City Planning*

By
 Carl J. Rhodin
 Chairman, City Planning Section

THE City Planning Section of the Commonwealth Club of California has for some time studied the development of the San Francisco Metropolitan District. In particular, consideration has been given to the requirements for future residential areas for the people of the Metropolitan District.

All the elements required for the development of a modern metropolitan city by way of population, location, trade territory, and natural resources, etc., are present and indicate that San Francisco as a city is destined to keep on growing continuously for a long period in the future. The problem of planning for this future is a fascinating study, and the Section as a group and its members as individuals have taken great interest and have devoted a large amount of time and labor on the subject.

Not a final recommendation,
 rather a review

Individually, the speaker has had the subject in his mind these last twenty-five years. Working on the Key Route construction when first arriving in San Francisco and having been associated prior to that with the constructors of the New York subways, he sketched out a plan of development which contemplated a subway system along the Market-Mission route. The expense of this plan was found to be too great for its day. On resuming the study, that location was found still generally adaptable; the street plan and the topographical conditions favor the location.

The study that the Section is presenting on this important matter is not a final recommendation, but is rather a review presenting important features and indicating a plan of action. The statistics contained have been assembled from published data and general costs

* Members of the Section on City Planning who attended one or more meetings during the discussion on the subject of Inter-County Rapid Transit include the following:

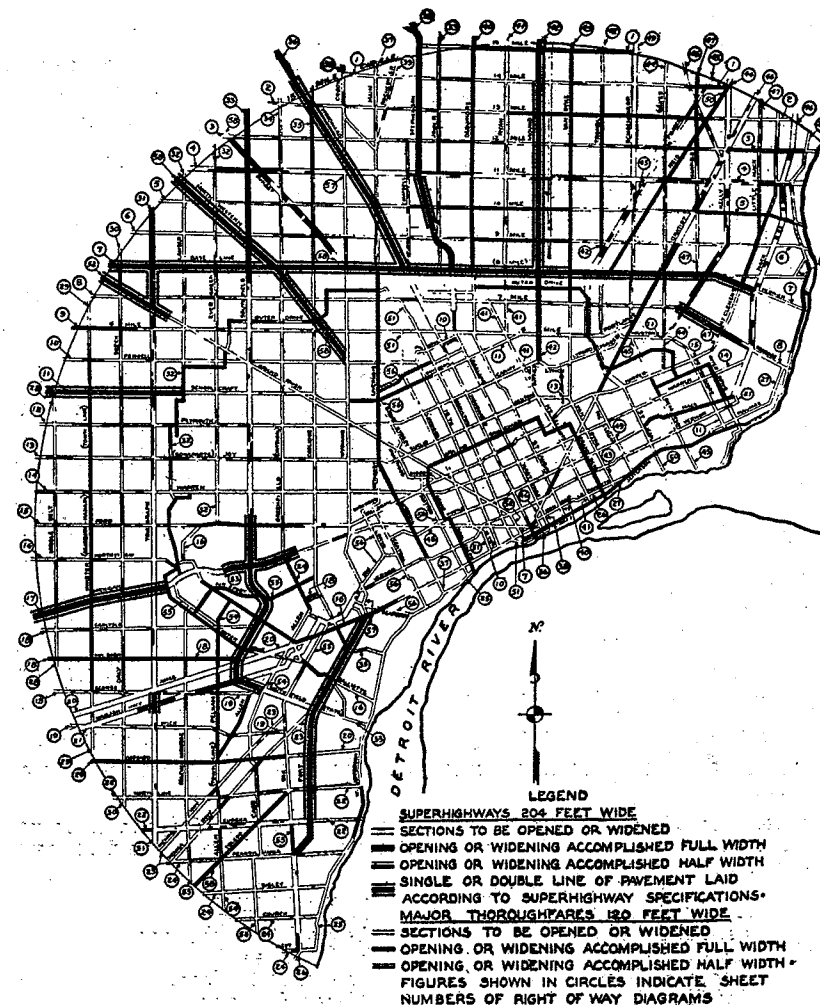
Carl J. Rhodin, chairman
 Morris M. Bruce, secretary
 Fred H. Drake
 Albert J. Evers
 James H. Hayes
 Ted Huggins
 John W. Leggett
 Franklin W. McCormack

Irving F. Morrow
 A. S. Musante
 Leopold Oppenheimer
 F. H. Redewill
 Lawrence M. Sizer
 Alfred F. Smith
 Stuart R. Ward

are submitted in Appendix I (p. 395) in order that the projects may be placed in financial perspective. Actual construction cost estimates will depend upon the detailed plans that are adopted.

Much study of an engineering and statistical nature is necessary before a final project may be formulated, and structures designed that will fit the circumstances in the most practical and economical manner.

The modern metropolitan city is the outgrowth of modern technique and modern construction. Given the necessary pre-requisites of natu-



Map 2. How Detroit Handles Her Rapid Transit Problem.
(Map corrected to December, 1930)

ral resources, location, population and culture, the development of the modern metropolis demands ample and adequate facilities, particularly of:

1. Water
2. Fuel and Power
3. Transportation.

The water service of San Francisco has now reached the stage where adequate supply for many years appears to be assured in the near future.

Transportation is chief undeveloped facility

The fuel and power supply is provided for principally by way of petroleum, natural gas and electric energy, through private enterprise and utilities under public regulation.

But the last of these items, transportation, does not occupy the same fortunate position as the two preceding ones. Transportation is available, up to present demands, but the various facilities for transportation now existing are approaching capacity limit and the additions that are to provide for future growth, require further consideration. The population estimates presented are based on past experience and contemplate potential increase provided ample transportation be furnished.

Transportation must be provided

Transportation within an urban community must be provided for the movement of individuals from their place of residence to their place of occupation. Without adequate transportation, growth is retarded and population density becomes greatly congested, leading to unsanitary and unfavorable conditions of health and welfare and to development of tenement and slum districts.

A specific type of city transportation has been developed in recent years and may be designated interborough rapid transit, which consists of a separate railroad system on its own right-of-way, on, above or below the surface, built to:

- a. Either relieve congestion already existing, or
- b. Develop city territory by making additional space available for residential use.

The time has arrived for San Francisco to give prompt and serious consideration to inauguration of rapid transit. In 1940 the combined population of San Francisco and San Mateo Counties will amount to 890,000 people. Much time will be consumed in organizing, planning, and financing the work. The experience of other cities indicates that

the time for action has arrived. Rapid transit lines were undertaken by:

| City | Year | Population |
|-------------------------------|------|------------|
| New York | 1870 | 950,000 |
| Brooklyn | 1885 | 710,000 |
| Chicago | 1893 | 1,215,000 |
| Boston | 1897 | 810,000 |
| Philadelphia | 1907 | 1,450,000 |
| * * * * | | |
| San Francisco-San Mateo | 1940 | 890,000 |
| * * * * | | |

San Francisco should not lag behind.

The transportation district of the metropolitan area of San Francisco includes the cities surrounding the Bay of San Francisco.

Means of communication outlined

In the center of this metropolitan area is the city of San Francisco, constituting one of the principal trade and financial centers of the world. By peculiar geographical conditions, this economic center is separated from its contiguous territory by the Golden Gate Straits, the Bay of San Francisco and the mountain spur at the southern boundary of the city area. The city area proper resembles an island surrounded by obstacles to transportation. Nevertheless, in spite of these obstacles, the city has developed into a business center of the greatest importance.

The means of communication connecting this center to its contiguous districts are as follows:

| District | Communication |
|-----------------------|---|
| North Bay Cities..... | Ferries Proposed Golden Gate bridge |
| East Bay Cities..... | Ferries Proposed Trans-Bay bridge Proposed submarine tunnel |
| Peninsula Cities..... | Main line railroad Surface traction lines Motor speedways Proposed interborough rapid transit line |

Under the conditions of location described, the study of passenger transportation will be divided into the following classes or groups:

1. Local passenger traffic within the city proper.
2. Transportation to the North Bay cities.
3. Transportation to the East Bay cities.
4. Transportation to the Peninsula cities.

Any study of transportation for any one of these groups must of necessity take into consideration the general situation and the influence of traffic from other sections. The traffic existing may be

compared with the pulsating bloodstream of a living organism and the movement of this stream must not be hampered or restrained, but it may be diverted or deflected, so long as it is not obstructed. In fact, any plan of improvement for one of the districts should endeavor also to improve generally the traffic to and from the other districts.

Market street bisects San Francisco

In this report, which is primarily concerned with the improvement and development of traffic between San Francisco and the Peninsula, an endeavor has been made to give proper consideration to the local traffic within the city and to the influence of traffic from East Bay cities and from the North Bay cities.

The local traffic within the city of San Francisco presents a singular characteristic in that the city is virtually bisected by Market street and the western end of Mission street, and all the traffic entering or leaving the area north of Market and west of Mission must traverse these streets.

Heavy traffic from local sources along Market street and Mission street is consequently to be expected and this traffic will continue to keep on growing. Any construction that fails to take this into consideration will cause added difficulties to the traffic problem and may seriously interfere with transaction of business and movement of passengers along these streets.

Congestion must be guarded against

If an unlimited amount of traffic from outside sources be introduced along the Market street route, congestion would result that would render that route practically impassable during the rush hours. The effect upon business and property along these streets would be disadvantageous and business would move to other locations where customers and clients might enter and depart without being jammed into a traffic stream and delayed perhaps for hours.

This condition has been kept in mind and the proposed improvements seek to avoid increasing the difficulty of crossing Market street.

At the present time, with a population of some 640,000 people, the density for the forty-two square miles of city area averages 15,000 per square mile. This average density is exceeded in the actually built-up districts on account of the limited area within the city utilized. With the growth of population in coming years, the density will be increased and additional areas for residential use should be provided.

Referring to Table A (p. 355) it will be seen that probable growth of population for the combined city of San Francisco and the Peninsula cities is rapid, with an increase of 184,000 in ten years, 444,000 in twenty years and, finally, 1,844,000 in fifty years. Where is this additional population to be housed without exceeding the density desirable for residential areas, amounting to 18,000 to 24,000 persons per square mile or six to eight residences per acre?

San Francisco must look elsewhere for area

It will be seen that with an allowance of 18,000 persons per square mile, the indicated additional area required for residential purposes is:

| | |
|-----------------------|------------------|
| In 10 years—1940..... | 10 square miles |
| In 20 years—1950..... | 25 square miles |
| In 30 years—1960..... | 46 square miles |
| In 40 years—1970..... | 74 square miles |
| In 50 years—1980..... | 102 square miles |

Obviously, these areas are not available within the forty-two square miles of the city itself, but must be found elsewhere. In this regard, San Francisco is fortunately located, being directly connected to the south with the Peninsula, where nature has provided one of the most adaptable and beautiful residential areas on the North American continent, if not in the entire world.

But obstacles and difficulties in regard to transportation have heretofore precluded its full utilization for residential purposes by the people of San Francisco. These obstacles have been sufficient to induce the growth of another residential area located across the Bay, primarily in Alameda county, which contains the residential homes of a vast number of people who are economically attached to San Francisco.

Obstacles must be severe to induce bay commuting

At the present time, some 50,000 to 60,000 people make the round trip each day across the Bay of San Francisco from their homes to their places of business, total traffic aggregating over 45,000,000 trips for the year.

It is apparent that the obstacles to land transportation must be severe when they induce travel first by ferry boat and then by rail, of such proportions.

Looking to the south and the Peninsula, we find the explanation. The available area on the Peninsula is narrow and elongated, being approximately twenty-five miles in length and two to three miles in

width. This long, narrow area is divided into an upper section and a lower section by the ridge at Hillsborough-San Mateo, which extends from the Coast Range towards the Bay Shore.

The upper section contains large areas for residential and industrial use and the lower section contains rolling hills of great beauty, particularly adaptable to development of the highest character.

Desirable peninsula area is undeveloped

In addition, on the city's southern boundary line, there arises an obstacle in the form of San Bruno mountain, which closes the entrance to the city and forces travel to the east and to the west, leaving pri-

TABLE A (See p. 354)

| Population | | | | |
|------------|---------------|------------------|-----------|--------------------|
| Year | San Francisco | Peninsula Cities | Total | Increase over 1930 |
| 1910 | 416,900 | 14,900 | 431,800 | |
| 1920 | 506,700 | 30,700 | 537,400 | |
| 1930 | 637,300 | 68,700 | 706,000 | |
| 1940 E | 760,000 | 130,000 | 890,000 | 184,000 |
| 1950 E | 900,000 | 250,000 | 1,150,000 | 444,000 |
| 1960 E | 1,100,000 | 440,000 | 1,540,000 | 834,000 |
| 1970 E | 1,300,000 | 740,000 | 2,040,000 | 1,334,000 |
| 1980 E | 1,500,000 | 1,050,000 | 2,550,000 | 1,844,000 |

Comparison of Growth of Population

(Estimated growth of peninsula cities compared with actual growth of the communities that constitute the City of Los Angeles.)

| Population | Increase | | Cities of Peninsula | | Cities forming Los Angeles | |
|------------|-----------|-------|---------------------|----------|----------------------------|----------|
| | | | Anno | Years | Anno | Years |
| 15,000 | ----- | ----- | 1910 | ---- | ----- | ---- |
| 31,000 | 16,000 | 107% | 1920 | 10 | 1884 | ---- |
| 69,000 | 38,000 | 123% | 1930 | 10 | 1894 | 10 |
| 130,000 | 61,000 | 85% | 1940 E | 10 | 1902 | 8 |
| 250,000 | 120,000 | 92% | 1950 E | 10 | 1908 | 6 |
| 440,000 | 190,000 | 76% | 1960 E | 10 | 1916 | 8 |
| 740,000 | 300,000 | 66% | 1970 E | 10 | 1923 | 7 |
| 1,050,000 | 310,000 | 42% | 1980 E | 10 | 1928 | 5 |
| Total | 1,035,000 | ----- | ----- | 70 | ----- | 44 |
| Average | | | 14,600 | per year | 23,400 | per year |

E—Estimated on basis of past records.

marily two gateways—the Colma bottleneck and the Bay Shore entrance. Furthermore, from these two points of entry, the distance to the business center is six to eight miles. As a result, much of this highly desirable area of the Peninsula has remained undeveloped.

While the distance in itself is not great, nevertheless, it presents more obstacles to traffic than the combined ferry and rail trip between the Oakland hills and San Francisco. But this Oakland residential area is approaching the limit of its usefulness to San Francisco. This is well indicated by the growth of traffic from the East Bay cities shown in Table B (appearing below), indicating how the commutation traffic tends to remain stationary, although the East Bay communities are growing rapidly. Economic forces are working towards limiting the usefulness of this area for residential purposes by the inhabitants of San Francisco.

The areas available to the north in Marin county offer highly at-

TABLE B (See above)

Traffic

1. East Bay Cities to/from San Francisco per Ferry Gateway.

| Year | Population Average | Passengers | |
|-----------|-----------------------|-------------------|----------------------------|
| | | Total per Year | Avg. per Day Round Trip |
| 1910..... | 232,000 | 34,000,000* | 46,500 |
| 1915..... | 280,000* | 37,900,000 | 52,000 |
| 1920..... | 336,000 | 40,200,000 | 55,000 |
| 1925..... | 400,000* | 43,900,000 | 60,000 |
| 1930..... | 457,000 | 45,000,000* | 62,000 |

2. Peninsula Cities to/from San Francisco per Peninsula Gateway.

| | | | |
|------------|---------|------------|--------|
| 1926†..... | 48,000* | 14,400,000 | 19,800 |
| 1940†..... | 130,000 | 24,000,000 | 33,000 |
| 1950†..... | 250,000 | 35,000,000 | 50,000 |
| 1960†..... | 440,000 | 44,000,000 | 60,000 |

Traffic Distribution Peninsula Gateway Entering and Leaving Daily
(Round Trip)

| | Motor Vehicles | Passengers | | Total |
|------------|-------------------|------------|-------|--------|
| | | Auto | Rail | |
| 1926†..... | 11,500 | 14,200 | 5,600 | 19,800 |
| | | 72% | 28% | 100% |

* Estimated.

† McClintock Traffic Report—1927.

‡ Estimate based on percentage of travel in relation to population of East Bay cities. Present tendency indicates that these estimates will be too low.

tractive residential sites and transportation to this district is improving. While some part of the added residential space required will undoubtedly be found in Marin county, more area is needed.

The city of San Francisco is confronted with this condition: If the city continues to grow at the same rate as in the past thirty years, additional residential space is required. The Peninsula offers immediate prospects. This report will review the possibilities of transportation to make the Peninsula residence areas readily available for the people who are to carry on the business of the city of San Francisco in the future.

Must not hamper
existing traffic

Any plan to improve present transportation of passengers from the Peninsula to San Francisco should provide for continued expansion of facilities already in use, and, in addition, should indicate how further facilities may be provided that will not interfere with nor hamper traffic already established. Present traffic is shown on Table B (p. 356), where estimates indicate capacity requirements of future traffic.

The estimates are tentative and approximate, but serve to indicate requirements in the years to come sooner or later. It must be recognized that traffic will flow only where facilities are provided and that traffic will not create its own facilities. As in shipping, docks must be built before the cargo arrives. The estimates are to be considered as indicating the amount of traffic that may be expected in case facilities are provided, and in case enterprise and business acumen in San Francisco increases in the future at the rate indicated by the past. If stagnation and no growth is anticipated, no expansion need be provided for.

Increasing tendency for
motor transportation

Traffic entering by the Ferry gateway appears to approach a saturation point of some 70,000 persons entering and leaving daily, partly due to the completed occupancy of the most available residential sites. There is an increasing tendency of these passengers to arrive by motor vehicles. A general increase would no doubt follow the construction of the Trans-Bay bridge in motor travel and interurban travel.

Motor traffic could connect with the Bay Shore boulevard and the adjacent street system, and interurban traffic could be connected to

the Mission loop later described, and to the local surface traction system.

In regard to the Peninsula gateway, the saturation point of traffic is not anticipated within the next fifty years. The traffic will keep on increasing at a substantial rate for a long time to come. This traffic is divided between motor vehicles and railroad transportation; at the present time, a greater number of passengers enter by means of motor vehicles than by rail and this condition may continue.

Nevertheless, railroad passenger travel shows continued and substantial increase and it would materially hamper development if adequate facilities are not provided for the increase of railroad travel.

Three classes of travel to be considered

Furthermore, with the increase of traffic in the industrial and business districts of the city, facilities must be provided for passenger transportation between the various boroughs within the metropolitan district.

There are, consequently, three main classes of travel that have to be considered in connection with San Francisco-San Mateo traffic:

1. Passenger travel entering by railroad;
2. Passenger travel entering by motor vehicles;
3. Movement of passenger traffic between the boroughs of the district.

Having in mind these requirements, the following major units of traffic development have been considered to provide for present and expected passenger traffic of an interurban nature, as follows:

1. **Main Line Railroad Improvements.**
 - a. Grand central terminal station
Mission and Townsend streets and 7th and 8th streets.
Depressed track system and station buildings.
 - b. Submarine tunnel
Four tracks—Townsend street-Alameda Point.
2. **Motor Speedway. Colma-Redwood City, twenty-five miles.**
Four to six lane paved roadway without grade crossings, with turnouts and cross-overs (initial unit).
3. **Interborough Electric Rapid Transit Line.**
 - a. Terminal loop—Mission street, Embarcadero - Capp street, double track, two miles.
 - b. Viaduct—Capp street to Colma, double track, eight miles.
 - c. San Mateo electric line—Colma to Redwood City, double track, twenty-five miles.

Terminal facilities must be improved

The increasing demand for passenger accommodation on the main line railroad requires principally improvement of station and terminal facilities. Continually increasing numbers of passengers will be de-

livered by motor vehicles to the suburban stations along the route. It should be kept in mind that the main line railroad will permit the greatest average speed of travel of any of the agencies considered, but that frequency of service has definite limitations.

All the accumulated traffic will be delivered at the terminal point in San Francisco. As now located at Third and Townsend streets, a large and greatly increasing amount of secondary transportation is demanded and this has to be accommodated at the present time principally along Third street, which also serves as an important outlet for the Bayshore highway now carrying a large amount of motor traffic.

Underground interurban terminal advocated

It has been suggested that interurban travel could be greatly facilitated and convenience increased if an underground interurban terminal be established between Townsend and Mission streets in the vicinity of Seventh and Eighth streets. Such an underground terminal would present no obstacles to the movement of surface traffic on Mission, Howard and Folsom streets and would deliver the incoming passengers at a centrally located point of the business district where surface transportation of a great capacity is available, consisting of four lines on Market street, two lines on Mission street and two lines on Howard street.

There would be an east and west movement of this discharged passenger traffic as against the present primarily northern movement on Third street, where only two surface lines are available. Furthermore, a great number of passengers would be within walking distance of their offices or places of business and would not burden the surface transportation system.

Main line railway traffic through tube

It is contemplated that a central terminal railroad station for the city would ultimately be located here with trackage underground, and this commute service terminal would form the first step in the construction of a central station. No obstacles to surface travel would result and passengers would be delivered at a convenient point within easy access of all of the principal office buildings, hotels, theaters, business houses, etc.

As a further development, it is contemplated that it will ultimately be found desirable to connect the main line railroad tracks terminating in the general vicinity of Townsend street by means of a sub-

marine tunnel to Alameda Point, where all the main line trackage on the Alameda side converges. A through connection would then result for main line traffic from Oakland under the bay to San Francisco and down the Peninsula.

This line would also serve local requirements and would greatly expedite through passenger and freight service. This element of transportation is included in this report as a future possibility of the plan, but this tunnel construction may not be undertaken in the next decades if the Bay bridge be constructed, although much cheaper transportation could be furnished by the tunnel than by the bridge.

**No grade crossings
permitted**

The northern end of the motor speedway indicated is already under construction. Beginning at Colma, a wide paved highway is being built paralleling to the west the Southern Pacific main line. It is connected at Colma with the contemplated motor boulevards within the city. This highway will be of primary importance in improving residential travel. It will directly penetrate the excellent residential area between the main line and the foothills, and this residential area is adequate in size and presents all of the characteristics that are desirable for the additional space needed for residential purposes of the metropolitan area.

In order that this highway may serve its full usefulness, no grade crossings should be permitted. Cross traffic should be carried over and under and outlets and turn-outs from the highway should be provided so that an uninterrupted flow of four or six lines of motor traffic may proceed at high speed along this highway. The topography of the area penetrated may require viaducts over canyons and tunnels under the ridges. But obstacles of this type should not cause deflection of the main direction of this route, substantially parallel to the main railway line.

**Right-of-way for double
track advisable**

This motor highway permits unlimited frequency of service and will serve a double purpose. It will not only act as a route of direct travel into the city, but by suitably located turn-outs to connecting roads, it will also serve as a route for motor bus lines that collect passengers for suitable distances and deliver them to express stations on the railroad located at suitable points. In this manner great time-saving in travel can be effected and added motor vehicle congestion within the city eliminated to some extent. These cross connections

could be extended to the Bay Shore highway already built. There are obstacles of right of way, but the entire length need not be connected at once, intermediate pieces would serve as useful feeder lines, until ultimately connected.

It would be advisable to provide a right-of-way for a double track electric interborough line along the route of this highway to be utilized, when population density of the area has increased to such an extent that this transportation is demanded.

The main railroad transportation above indicated utilizes the Bay Shore gateway east of San Bruno mountain into San Francisco and terminates in the Mission district. The movement of traffic from the terminal is north and west and a considerable portion of this traffic flows west along Market, Mission, Howard streets, etc.

At Colma, a great deal of motor vehicle transportation will enter the city and will be limited in speed as it approaches the center of the city. Some of the motor vehicles arriving at Colma could be parked there and passengers be transferred to local rail transportation.

**Rapid transit system to
parallel Mission street**

To take care of this flow of east and west traffic without further congesting surface travel, a double track rapid transit system generally paralleling Mission street is contemplated. This track system should be built as subway or elevated, without grade crossings, and would commence near the Ferry building or east end of Mission street and follow along the Mission street-Capp street route, underground or elevated, and then on a viaduct paralleling Mission street until it crosses the old Southern Pacific line. At this point the viaduct would follow the railroad right-of-way or the same general direction, to Colma.

In the initial stage, the system would terminate at Colma where connections could be made with the now operated electric surface line to San Mateo. Complete electric high speed transportation of high frequency would then connect the heart of San Francisco business district with San Mateo, following the Mission route. Ultimately the interborough system would be extended south from San Mateo to Redwood City and Palo Alto and connect with the electric lines of the Peninsula railway.

Before the central terminal station at Mission and 7th street is constructed, the terminal subway loop on Mission street could be connected with the present Southern Pacific main line for commutation service, while main line Pullman and through passengers would be

using the station at 3rd and Townsend streets. The loop could also be connected with the terminal of the Bay bridge proposed at Rincon hill. In years to come, another southern branch would commence at Colma and parallel the main railroad line a mile to the west.

Market street subway in contemplation

Other routes are possible for this interborough electric line, but the topography and street plan of the city favor generally a location following Market and Mission streets. The traffic lines above described would provide facilities for the next decades and with continued growth, additional tracks could be added. This system has practically unlimited expansion possibilities and can be readily connected with subway or elevated lines to other parts of the city, as required.

A subway on Market street is under contemplation in connection with the local electric surface traction system. This subway, if constructed, would greatly decrease the density of traffic on the surface of Market street, and facilitate distribution of passengers.

Report considers facilities as unit system

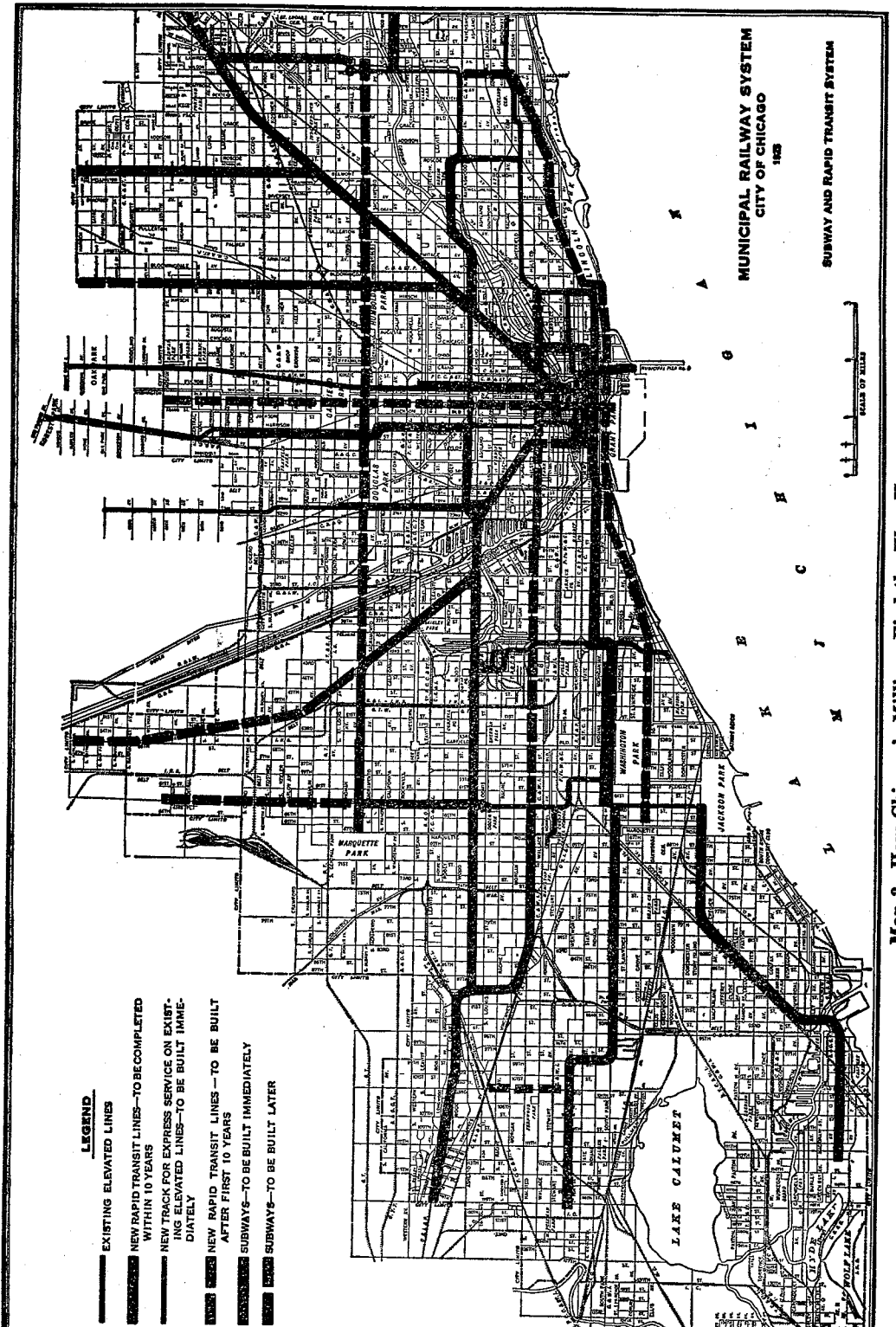
The Market street subway could be connected through the Twin Peaks tunnel by the municipal line with Colma and serve as an additional link of the electric transit system to the west of Mission street, and this system could be extended north to connect with the terminus of the Golden Gate bridge when constructed.

It will be noted that this report considers facilities now existing and under contemplation operating as a unit system. The efficiency of any one of the units would depend to a great extent upon the proper coordination with the other units. It would seem that a rapid transit commission should be organized and appointed jointly by San Francisco and San Mateo counties and provided with ample authority and funds for engineering and direction of the traffic development.

Coordination would bring great improvement

A great improvement of local surface traction in San Francisco would result from coordination of the operations of the three systems that now serve the city. This would relieve congestion on Market street and pave the way for ultimate plans to accomplish construction of the Market street subway. The expenses incidental to such a program would be gradual and be borne by the systems.

The development of motor speedways is proceeding gradually by expenditures of San Francisco and San Mateo counties. This work



Map 3. How Chicago's Millions Find the Way Home.

should be speeded up. It would seem that here is an opportunity to provide work for unemployed in connection with the relief activities of the two counties.

A step that would greatly improve peninsula commutation would be the construction of depressed tracks and station near Seventh and Mission to connect with Southern Pacific main tracks at Seventh and Townsend. The distance is about three-quarters of a mile, construction would probably cost \$3,000,000 to \$4,000,000. At the present time some 6,000 passengers arrive and 6,000 depart daily from

TABLE C (See p. 365)
Peninsula Central Residential Area
San Mateo County
(Territory west of Southern Pacific main line: 20 to 25 mi. x 2 mi. = 40 to 50 sq. mi.)
Area Capacity

| Area | Residences | Population | Value of Improvements |
|-----------------------------------|------------|------------|-----------------------|
| 1 acre..... | 6 | 30 | \$ 60,000 |
| | 8 | 40 | 40,000 |
| 1 sq. mi. | 3,600 | 18,000 | 36,000,000 |
| (net use 600 acres) | 4,800 | 24,000 | 24,000,000 |
| 40 sq. mi..... | 144,000 | 720,000 | 1,440,000,000 |
| | 192,000 | 960,000 | 960,000,000 |
| 50 sq. mi..... | 180,000 | 900,000 | 1,800,000,000 |
| | 240,000 | 1,200,000 | 1,200,000,000 |
| Approximate for area..... | 200,000 | 1,000,000 | 1,000,000,000 |
| Average per mile of distance..... | 10,000 | 50,000 | 50,000,000 |

TABLE D (See p. 365)
Peninsula Residential Area
Building Construction
Value of Housing Facilities for Increasing Population

| Year | Population Estimate | Increase over 1930 | Housing Improvements |
|-----------|---------------------|--------------------|----------------------|
| 1930..... | 70,000 | | |
| 1940..... | 130,000 | 60,000 | \$ 60,000,000 |
| 1950..... | 250,000 | 180,000 | 180,000,000 |
| 1960..... | 440,000 | 270,000 | 270,000,000 |
| 1970..... | 740,000 | 670,000 | 670,000,000 |
| 1980..... | 1,050,000 | 980,000 | 980,000,000 |

Above based on average cost of housing of \$1,000 per person, which will probably be exceeded in the area under consideration.

Third and Townsend. It should be worth five cents extra to be delivered at the proposed station for the majority of passengers. This would amount to \$500 to \$600 per day or some \$150,000 per year, corresponding to five percent on \$3,000,000.

This construction would be the first unit of the central terminal station which might be owned and operated by a separate corporation in the same manner as the terminal stations have been developed in Washington, D. C., Cleveland, Cincinnati and other cities.

The above activities should proceed at once. The capital expenditures required are relatively small and great improvement would result.

Mission-Capp-Colma line is next important step

The next important step would be development and promotion of the Mission-Capp-Colma line of subway, which is mentioned as Line No. 4 in the City Engineer's Transit Report of 1931.

The interborough transit system would result in great development of the territory traversed. The increase of value of the suburban territory is indicated on Tables C and D (opposite), with an ultimate value of improvements of over \$50,000,000 per mile of distance. A subway on Mission street would have a like influence on business property on the two-mile distance from the Embarcadero to Capp street and a large enhancement of value would result along Mission viaduct

Rapid transit district might be organized

It is suggested that a rapid transit district might be organized to own the track system in the same manner as irrigation districts, water districts and public utility districts organized under the laws of California own property. The cost of improvements could then be spread over the property benefited and transportation would not have to carry the burden of the fixed investment in track. Transportation could then be furnished at a low rate, corresponding to the cost of operation only. The district should have power either to operate the system or to lease the operation after competitive bids to competent parties, such as the railroad company, the Market Street company, or others.

The progressive development plan mentioned indicates that a gradual development of the system is practical and feasible. The capital burden would follow increase of population and development and would not come as a staggering initial expenditure of prohibitive proportions.

Recommendations and conclusions of the Section

The Section recommends* for improvement of traffic in San Francisco and transportation to San Mateo:—

1. *To relieve congestion and improve local service:*

Co-ordination of service on the surface electric and cable traction systems now operating in San Francisco, ultimate construction of Market street subway, connections of system to Colma and Golden Gate bridge.

This system would use surface type cars, enter and exit from street level. (City Engineer's Report—1931.)

2. *To provide safe and speedy motor routes:*

Early construction of motor speedway, Colma-Redwood City, and connections to Bay Shore boulevard and main line stations. Grade crossing elimination.

3. *To provide high-speed and convenient commutation service:*

Immediate action to provide for a subway commutation service station near 7th and Mission to connect with Southern Pacific main line and to form the first unit of central terminal station in that vicinity.

4. *To provide frequent 24-hour, inter-district service:*

Immediate action to organize and promote construction of interborough rapid transit system. First unit the Mission-Capp-Colma line (Line No. 4, City Engineer's Report, 1931), connections at Colma with the San Mateo electric line, extension of the same line south to connect Peninsula Railway. Grade crossing elimination.

This system would use express type subway cars, enter and exit at stations only, cars to be capable of highest speed mechanically obtainable.

5. *Consolidated plan.*

The Section concludes that a consolidated plan coordinating all various agencies of passenger transportation is desirable in order to accomplish the greatest benefit to all concerned, and that this plan should consider the development and improvement of:

Main Line Passenger Traffic;
Terminal Facilities;
Motor Speedway Development;
Interborough Rapid Transit;
Local Surface Traction Service.

* For information regarding cost, see Appendix I (p. 395).

Peninsula Rapid Transit and Union Depot

By
Philip R. Thompson
Realtor,
Former Roadmaster S. P. Co.

President Johnston: I am sure you all agree with me in the statement that the Section has made a thorough and comprehensive report. Mr. Philip R. Thompson, realtor, whose business has caused him to watch traffic trends and who has made a special study of this particular problem, will speak on the phases of rapid transit and the union depot.

SAN FRANCISCO is inseparably associated with Peninsula and trans-bay transportation. Equally adequate transportation between San Francisco and these areas will make possible the fullest development of the San Francisco Bay Metropolitan Area and San Francisco, its trade center.

A rapid transit system, with an up-town elevated loop in San Francisco, to serve trans-bay interurban traffic is included in the trans-bay bridge plans.

The layout in San Francisco and on the Peninsula, together with the plan for serving trans-bay interurban traffic via the Trans-Bay bridge, offers a unique natural opportunity to create a rapid transit system with an up-town union depot in San Francisco to co-ordinate all transportation systems serving San Francisco interurban, state and trans-continental traffic, at relatively much less cost than most metropolitan cities.

Existing lines should be consolidated

Rapid transit facilities to serve San Francisco and the Peninsula can be created by consolidating the already existing transportation lines and rights of way, and adopting the following combination of proven methods of modernized transportation in metropolitan areas where the people have to be transported en masse to meet the requirements of working hours:

Up-town elevated loop—It conforms to the plan adopted by the Hoover-Young San Francisco Bay Bridge Commission to serve trans-bay interurban traffic.

High-speed electric transportation—It provides the frequency and high speed required in metropolitan areas.

Co-ordinated bus service—As feeders of the electric system where the layout and traffic justify.

Union terminal depot—It is one of the greatest assets of a city, both in value of attractive appearance to visitors and in facilitating the handling of traffic in great cities.

An important feature of the layout is that it will make possible the adoption of a plan that will permit freedom of action—the San Francisco-Peninsula rapid transit system with the up-town elevated loop, the up-town union depot with its steam railroad approaches and the Trans-Bay bridge could all be undertaken, and proceeded with, at different times and when consummated, fit into the picture perfectly, creating a modern metropolitan transportation system.

The problem is to work out and plan rapid transit facilities that will be most conducive to the fullest development and growth of San Francisco and the peninsula. A study of the layout of the various transportation lines serving San Francisco and the data referred to in Appendix II (p. 396) shows the following:

**Elevated provided for
by commission**

- 1. That the Hoover-Young San Francisco Bay Bridge Commission, in its plans for the Trans-Bay bridge, has provided for an elevated loop in San Francisco for the rapid transit system serving San Francisco trans-bay interurban traffic.
- 2. That Southern Pacific steam railroad lines run to Townsend and Sixth streets.
- 3. That Western Pacific-Great Northern lines run to Brannan and Seventh streets.
- 4. That the above three factors, being fixed, result in the conclusion that all San Francisco transportation systems can be served by a union depot located at the end of the elevated loop of the trans-bay rapid transit system at Sixth street, between Minna and Clementina streets, where it would be easily accessible to Southern Pacific and Western Pacific-Great Northern steam railroad lines via underground approaches—the elevation of the ground from Townsend street lends itself to this method of approach.

**High speed system to aid
in development**

- 5. That a high speed electric rapid transit system with an elevated loop from an up-town terminal in San Francisco to its suburban areas beyond Twin Peaks and down the peninsula will make possible the fullest development of the metropolitan area. (See Appendix II.)
- 6. That high speed electric rapid transit, as compared with steam trains:
 - a. increases frequency of service and train speed. (Table A, Appendix II.)

- b. increases suburban development; increases traffic and revenue.
- c. improves service by facilitating terminal operation.
- d. increases operating efficiency—reduces operating cost. (See Appendix II.)

**Elevated loop a factor
in transit system**

- 7. That such a high speed electric rapid transit system can be created by providing an elevated loop (between Sixth and 12th streets, along Minna and Clementina streets, with a main line leg over Capp street, a leg over 12th street to the inside tracks on Market street and a leg over 12th and Harrison streets to 16th and Harrison) and consolidating the already existing transportation lines and rights of way, as shown on Table C, Appendix II. The lines and rights of way to be consolidated are as follows:
 - Municipal lines, as specified.
 - Market Street lines, as specified (these lines would be separated from the local system).
 - Southern Pacific Valencia street line.
 - Extension of Market Street railway lines on Southern Pacific right-of-way from State Burlingame to Palo Alto.
 - Plus coordinated local bus service where traffic justifies, say, at Burlingame, San Mateo, Redwood and Palo Alto.

**Union depot to enable
coordination of lines**

- 8. That a union depot, located as above, and the creation of a rapid transit system, as outlined, would enable the coordination of all transportation systems serving San Francisco interurban, state and trans-continental traffic, thus contributing to the convenience and comfort of the traveling public. (See Appendix II.)
 - The union depot is centrally located with respect to San Francisco's commercial, business and shopping districts. It would be designed to serve the following traffic:
 - Steam railroadsunderground
 - Buses and street cars.....ground floor
 - Suburban and interurban.....second floor
 - The elevated loops are within a block and a quarter of Market street and will provide ideal service for both peninsula and trans-bay traffic to and from San Francisco's commercial, business and shopping districts.
 - The main line leg of the elevated loop will provide ideal service for such traffic to and from the Mission business and shopping districts.

9. The estimated unit costs of the above facilities would be approximately as follows:

| Description | Estimated Cost |
|---|----------------|
| Elevated loop from Sixth street west..... | \$ 4,500,000 |
| High speed electric lines..... | 5,500,000* |
| Equipment | 2,500,000 |
| | <hr/> |
| | 12,500,000 |
| Union depot | 9,500,000 |
| | <hr/> |
| | \$22,000,000 |

Basis of estimates:

1. Hoover-Young commission estimated cost of trans-bay elevated interurban loop, 2.33 miles, \$2,505,600 peninsula interurban loop is four miles in length.
2. Comparative, as per data and reference listed in the attached exhibit.

Bond interest at four and one-half percent would require the following for the first year:

| | | |
|-----------|--------------|-------------------------|
| 1934..... | \$12,500,000 | \$562,500—Bond interest |
| | 9,500,000 | 427,500— " " |
| | | <hr/> |
| | | \$990,000 |

Interests affected are listed

10. Financing: The interests that would be affected by consolidation are as follows:

Municipal Railways (City of San Francisco)
Market Street Railway
Southern Pacific
Western Pacific-Great Northern
Pacific Greyhound Lines
Santa Fe Railroad.

At Cincinnati and Cleveland (Appendix II) the interests affected became the proprietary interests of a company which was formed to consummate the project; the proprietary interests guaranteed the bonds necessary to the financing of the project.

Suggestions offered, prompted by study

The study and data also prompts the following suggestions:

- a. That in the meantime the peninsula service could be very much improved if the Market Street railway would route its peninsula cars as shown on Table D (p. 405, Appendix II).
- b. That it is feasible for the rapid transit system to establish a surface loop at South San Francisco-San Bruno area.

* Includes equipment storage yard.

- c. That to relieve the street car traffic on Market street and encourage the development of the Sunset district by reducing travel time, it is feasible, and may be advisable, to add a Sunset surface loop to the rapid transit system.
- d. That provision should be made for the extension of the overhead Harrison street automobile highway of the Trans-Bay bridge, as shown on Table E (Appendix II, p. 405).
- e. That any plan for a boulevard following the route of the Junipero Serra behind the cemeteries and extending along the foothills west of the peninsula cities, include a provision for a right-of-way for the extension of the rapid transit system in the future when justified.

Discussion From the Floor
By the Meeting

Under
Five Minute Rule

President Johnston: This proposition is now open to discussion from the floor, under the five minute rule. Mr. Grunsky, would you lead in the discussion?

Remarks by C. E. Grunsky
Consulting Engineer

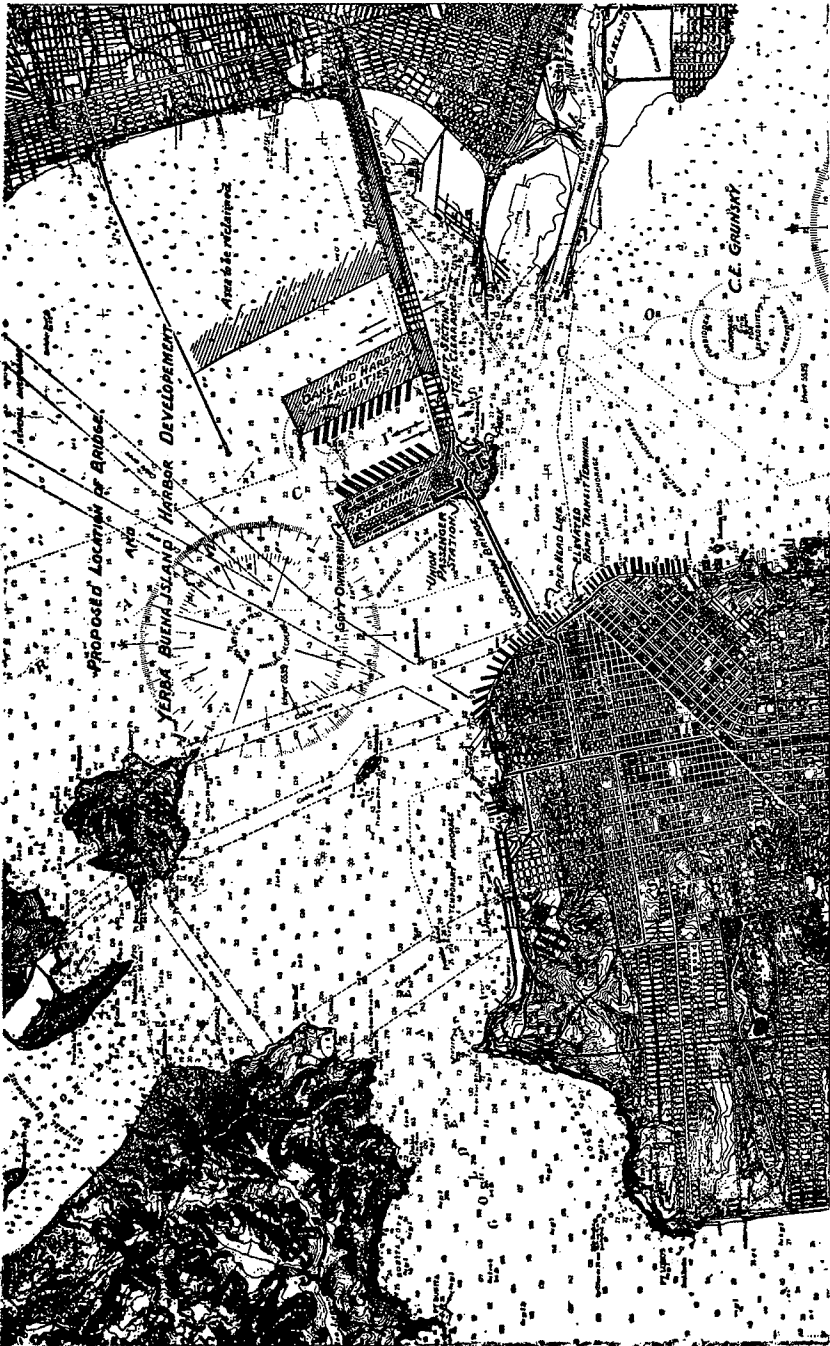
MR. GRUNSKY: Attention has been drawn in the Section's report to the fact that the flow of traffic within San Francisco will present a peculiar problem. There will be, we are told, heavy traffic along Market and Mission streets and this traffic will be dense and will continue to grow. Nothing, however, has been said about the material effect on the future development of certain sections of San Francisco, particularly the lower Market street district, which the San Francisco terminal of the Bay bridge will have, if located as proposed.

The Advisory Board on Bay Bridge Problems, whose members were appointed by President Hoover and Governor Young, made a definite recommendation relating to the location of this bridge. Apparently this location has been accepted as final by the State authorities.

On the proposed location, the San Francisco terminal of the bridge will be at Rincon Hill far south of Market street. From this point the bridge will cross the main navigable water of the bay to Yerba Buena island, passing diagonally over the present trans-bay ferry lanes and will be extended thence to Oakland practically parallel with the line of the present Key Route mole.

Adequate provision will, no doubt, be made for landing the incoming rapid transit traffic at convenient points on the streets which lead southwesterly and westerly into the Mission such as Bryant, Harrison, Howard, Folsom, and Mission. Recourse will probably be had to elevated rail extensions from the bridge to a number of rapid transit stations.

It may be assumed that the truck and the automobile with business in the down-town area can descend from the bridge, or reach the same, by means of conveniently located ramps. The great majority of motor vehicles, however, must in some fashion be brought down to the street level en route to their destinations down the peninsula, or into the western part of the city to reach Golden Gate park, the Ocean beach, the Presidio, or the proposed new Golden Gate bridge to Marin county.



Map 5. Illustrating Remarks by C. E. Grunsky (p. 384).

For these automobiles new thoroughfares in part through business areas will be required and particular provision will have to be made for crossing the heavy traffic on Market street.

A trans-bay bridge on the proposed location will be supported by piers, two of which, even if the main bridge spans be given a length of 3000 feet, will be located in or near the present trans-bay ferry lanes. This being the case, it is quite possible that ferry service will be discontinued or that the ferry terminals will be removed from the foot of Market street to some point southward from the bridge. If this be the case there will no longer be a heavy flow of traffic on lower Market street. The entire future development of the lower Market street district will be adversely affected.

There is another fact, too, which should be taken into account in planning the ultimate traffic facilities for San Francisco. It should be assumed that at some time in the future there will be a bridge from Hunters Point to Alameda. In view of this probability the bridge now in contemplation should enter San Francisco as far to the north as possible.

It is believed that a two span suspension bridge with only three piers in the water of the bay could be constructed with a terminal near the foot of Broadway. If constructed on this location, with the first pier at the San Francisco pier head line, there would be a clear opening between this pier and the next of more than one-half mile. A bridge in this location would interfere with the manipulation of shipping in the bay much less than a bridge on any other location. It would destroy less of the available anchorage ground.

The rapid transit terminal of such a bridge would be on the Embarcadero at the present ferry terminal and to the north and south thereof. It would be necessary to double deck the Embarcadero.

The automobile traffic which is headed for the north, the west, and the south would be carried at an upper level on a widened Broadway across Columbus avenue to a wide tunnel with its western exit somewhere near Polk street. Trucks and business automobiles would leave or reach the bridge by ramps rising from points at or near the Embarcadero. The rapid transit terminal of a bridge on this location would minimize the disturbance of the present flow of traffic in San Francisco.

Furthermore, whenever desirable an elevated extension could be carried south along the Embarcadero and along any of the streets which enter the area south of Market street. In planning for the future requirements of San Francisco the merits of this alternate project

should be carefully weighed before the city is definitely committed to the other project which will involve early and very extensive changes in the regional development and in the transportation facilities of San Francisco.

Remarks by M. M. O'Shaughnessy
City Engineer of San Francisco

MR. O'SHAUGHNESSY: There are a few points to which I want to direct attention. One is the statement of Mr. Thompson that the Hoover-Young Commission had recommended an elevated railway to Sixth street. I believe he is in error in this. I do not think the Hoover-Young Commission referred to an elevated railway. Reference to such a railway, however, was made in a previous report to the city by Professor Talbot of Illinois, an engineer selected by the city, Mr. John D. Galloway, and Mr. Ridgway, the great transportation man of New York; who recommended such a route. And I think Mr. Thompson should correct the record unless he has data to place this recommendation on the Hoover-Young Commission.

MR. THOMPSON: My statement was to the effect that the elevated is included in the estimate of the cost of the Hoover-Young Commission bridge.*

*Referring to Mr. O'Shaughnessy's questioning the fact that Hoover-Young Commission Report included an elevated loop in its plans for the Trans-Bay bridge, the following is quoted from the report.

"Page 2. To meet the present and future needs of the several communities a crossing for traffic between San Francisco and East Bay cities is necessary.

"Page 3. (e) A bridge on the location designed as Location No. 4 from Rincon hill via Goat island thence paralleled to the Key Route mole, is practical from an engineering standpoint. It is economically feasible under a proper fiscal plan and will adequately serve the needs of trans-bay traffic.

"Page 138. Interurban railroad traffic turns off the approach viaduct and runs over an elevated loop on First street to Minna street; from which it proceeds west on Minna street to Sixth street; south on Sixth street to Clementina street, then east to First street.

"Page 142:

Table No. 39, Structure Location No. 4

(Estimated Double Deck Structure. Six Traffic Lanes Upper Deck; Four Tracks, Lower Deck.)

| (Item No.) | (Description) | (Cost) |
|------------|---------------------------------|-------------|
| 1 | San Francisco plaza | \$ 253,000 |
| 2 | 1st to 4th streets | 767,000 |
| 3 | 1st to anchor arm | 1,542,700 |
| 4 | Interurban loop (S. F.) | 2,505,600 |
| 5 | Highway loop (S. F.) | 871,300 |
| 6 | West channel (Br.) | 41,815,000 |
| 7 | Goat island | 2,973,100 |
| 8 | East channel | 15,099,400 |
| 9 | Key Route mole, Yerba Buena St. | 1,549,200 |
| 10 | Key Route mole, 22nd street | 572,000 |
| 11 | Key Route mole, R. R. | 567,600 |
| Sub total | | 63,505,900 |
| Say | | 63,600,000 |
| Property | | 3,400,000 |
| Total | | 72,000,000" |

P. R. Thompson.

Mr. O'SHAUGHNESSY: The terminus provided by the Hoover-Young Commission differs entirely from the terminus of the bridge provided by the city's engineering board which terminus was placed at the center of Rincon hill. By the way, the Hoover-Young Commission have changed the location of their terminus within the last six months. They have moved it a block further south where bedrock is higher up. But they are still studying the problem and it will possibly be months before they give us definite data or a definite recommendation.

Mr. Thompson discussed, I believe, the report made by Mr. B. J. Arnold on the Twin Peaks tunnel. According to Mr. Arnold's report, the Twin Peaks tunnel would be brought down as far as Valencia and Mission, at an estimated cost of \$7,000,000.

I think I know the appetite of San Francisco for assessment districts. I made a survey in 1891 carrying a cable route extension of Market street over Twin Peaks to the ocean. Although at the start everybody was for it, along came the dull times; and by the end of the year when I had the plans made I was out of pocket and in experience to the amount of \$5,000.

Therefore in 1913 I eliminated that portion of the Twin Peaks tunnel from Eureka Valley to Valencia street. That shaved \$3,000,000 from the total cost, reducing it to a \$4,000,000 proposition. Even with this reduction, levy of the assessments was by no means easy. The big building owners on Market street, with relatively moderate assessments, objected strenuously, whereas the owners of the sand lots beyond the Twin Peaks were enthusiastic.

We had to modify the assessment district on Market street and reduce the minimum charge to \$10 a lot. And now the Harvard Business School uses this San Francisco project as an example to all cities of how a large project should be carried through. But somebody else can do it next time.

Now, Mr. Rhodin made some rather flattering comments as to the Philadelphia rapid transit. When, a year ago, I visited Philadelphia, I rode on the Philadelphia rapid transit line for three and one-half miles and I was a lonely passenger. It paralleled surface street car lines which the people patronized. That project has cost the citizens of Philadelphia \$103,000,000, and they are getting absolutely no benefit from it.

Although Mr. Rhodin spoke of a railway line on Howard street, it is the city's definite plan to make a boulevard out of Howard street, and to remove the tracks from it.

Nor do I see how a sub-aquaeous tunnel from Third and Townsend streets to Alameda will aid interurban traffic. Mr. Rhodin's estimate

of \$40,000,000 for a sub-aquaeous tunnel, three miles long, is entirely inadequate. The Holland tunnel in New York, one mile and three-quarters long, has cost over \$50,000,000. Building sub-aquaeous tunnels is not a very easy proposition.

Another point he makes that I think is ridiculous is that of building a high line boulevard through Hillsborough and San Mateo but dodging obstacles. Neither a high line boulevard nor a railway can afford to dodge obstacles. We have surveys made now for this high line boulevard, the extension of the Junipero Serra boulevard, which is now built a mile south of the county line into San Mateo. All we need is legislative cooperation from San Mateo county to proceed with the work.

Mr. Rhodin also mentions the advantage highway work would be to unemployment relief activities. Highway work may be of some value in such activities, but not to the extent that people generally imagine. All highway work of any magnitude must be done by contract, and the steam shovel and machinery equipment are the most economical tools to do the work. Five men with one steam shovel can do the work in excavating pipe trench formerly requiring 2000 men.

Now, Mr. Grunsky has spoken of the bridge head selected by the Hoover-Young Commission; and while I hold no brief for that commission, nevertheless the city is to have no say whatever as to that bridge. It will be the property of the State of California, paid for and controlled by the State, and the State will put the terminal wherever it wants it.

Wherever the State places the terminal, the city of San Francisco will have to accept the traffic problem created and make adjustments to meet. And no matter where the bridge head is situated near Rincon hill, I think we will be able to handle the traffic.

Remarks by W. H. Kirkbride

Engineer Maintenance of Ways and Structures, Southern Pacific Company

MR. KIRKBRIDE: It is evident, as stated by Chairman Rhodin, that the subject of rapid transit within San Francisco and on the Peninsula, has been long and earnestly considered by the City Planning Section of the Commonwealth Club of California, resulting in the presentation of a report well worthy of careful consideration. It represents a basis upon which detailed engineering and economic studies may be made.

I do not feel qualified, with only a few days' study of the report, to offer suggestions or modifications.

Manifestly, as the San Francisco and Peninsula areas grow in population, additional transportation facilities of the various kinds now available will be required.

Speaking on behalf of the Southern Pacific Company, I will state that we have been and are interested in the development and advancement of this metropolitan area.

We see in the future large increase in population and are anxious to promote, as far as we possibly can do so, any proposition that will hasten such a development, and in the working out of any engineering and traffic problems we stand ready to work with the committee.

The sums of money involved in the undertaking suggested by the Section are very large and I believe any plan of improvement should take cognizance of the economics of the problem, and that there must be a fair return on the investment. This is true even though considered as a civic undertaking, because the cost of any such project is met by the public through increased taxes.

It so happens that our main line railroad from the Peninsula cities to San Francisco is the shortest route of any now existing. This by reason of the fact that in 1907, anticipating increased business, the Company at an expense of over ten million dollars, not including freight facilities, constructed the Bayshore Cutoff from San Bruno to Third and Townsend streets, San Francisco, shortening the distance, compared to the old line, by 2.6 miles, and to a much greater degree expediting the movement of trains.

By way of parenthesis I may state that including freight and terminal yards, shops, engine house, real estate, etc., the railroad investment between San Francisco and San Bruno approaches the 45 million dollar mark.

This railroad, following practically a straight line over viaduct and through tunnels, is without grade crossings for a distance of 7.7 miles.

Prior to the construction of the Bayshore cutoff the old main line built in 1864, was double-tracked San Bruno to San Jose, accompanied by grade changes and some local grade separations, at an expense of slightly less than ten million dollars.

It will readily be seen that railroad development can conform and follow along the lines of any agreed-upon development consistent with the volume of traffic handled by said means of communication.

The construction of super-highways now being built and undoubtedly to be built in the future, conforming to the plans of the municipality and suggestions of the committee, will obviously, by means of motor vehicles, handle a very large volume of the commute business,

which has a very vital bearing on the degree to which main line railroads can extend their facilities.

Unfortunately, following the construction of the double track and Bayshore cutoff, the anticipated volume of business never materialized in spite of greatly improved service. The present double track with facilities is far from being used to full capacity.

It is a matter of common knowledge that the interurban service between San Francisco and San Jose, with high standards of equipment, roadway and service, is not excelled anywhere in the country; but, as brought out in the report, this service handled in 1926 only twenty-eight percent of the total traffic involved.

The present local passenger service on the Peninsula does not return operating costs and taxes, therefore, no return on investment, and roadway and equipment.

In face of declining revenues, due to automobile competition, the question naturally presents itself as to what volume of rail traffic may be expected, that would warrant increased investment to meet the demands of a growing population.

From the very nature of things, railroad investments can be made only as revenues or expected revenues will justify; and no doubt this problem will require serious study on the part of any city planning committee in working out the practical details of the matter.

As previously stated, we are anxious to be helpful in arriving at the proper solution of this momentous problem leading to the greater growth and general prosperity of San Francisco and Peninsula areas.

Remarks by C. H. Judson
Member City Planning Commission of Palo Alto

MR. JUDSON: I came to this meeting tonight at the request of the Mayor of Palo Alto. I was very much interested, and I heartily concur, in what my neighbor from San Mateo had to say. We are intensely interested in the growth of San Francisco for living within our borders are many people whose daily business brings them to San Francisco, and a very much larger number of people whose mercantile trade also brings them to that city.

Remarks by James H. Hayes
Sec.-Mgr. Pacific Fruit Exchange

MR. HAYES: I do not live on the Peninsula, I live on top of Twin Peaks. However, it is more comfortable to live in Burlingame than on the other side of Twin Peaks. You can read your newspaper on the train. And on the Peninsula the railroads may be used to good advantage for hauling commuters.